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PRACTICAL INSTRUCTION IN BOTANY

A Course of Practical Instruction in Botany. By F. O. Bower, M.A., F.L.S., Lecturer on Botany at the Normal School of Science, South Kensington, and Sidney H. Vines, M.A., D.Sc., F.L.S., Fellow and Lecturer of Christ's College, Cambridge, and Reader in Botany in the University; with a Preface by W. T. Thiselton Dyer, M.A., C.M.G., F.R.S., F.L.S., Assistant Director of the Royal Gardens, Kew. Part I. Phanerogamæ-Pteridophyta. (London: Macmillan and Co., 1885.)

IT is with more than ordinary satisfaction that we welcome this volume. Apart altogether from consideration of its intrinsic excellency, its appearance is gratifying as a first product of the younger school of botanists in this country—a school which for some years past has been doing good work in oral teaching, though up till now it has not contributed to teaching literature—and it is time that its methods were put in a more permanent form and made more generally accessible. The inconsistencies and inaccuracies characterising, with few exceptions, our endemic botanical text-books and our dependence for reasonably safe handbooks with information up to date upon translated works, mostly of German authors, are a reproach for which every botanist would gladly see the cause removed. At last we have a prospect of this, and the volume now before us is an instalment of a work which will in great part do so. The names of Thiselton Dyer, Bower, and Vines on the title-page are a guarantee of its thoroughness and accuracy, and the book certainly bears out their reputation.

The book took origin, as Mr. Thiselton Dyer informs us in the preface, in the work initiated by him at South Kensington in 1873. It is no small merit to have started at that time a system of instruction which embraced the examination by every student of the leading morphological facts of every important type in the vegetable kingdom. And this programme, which Mr. Thiselton Dyer set himself and successfully carried out, has not only eventuated in what, with him, we hope will be permanent—the institution, in what is now the Normal School of Science, at South Kensington, of a lectureship on botany, but also, in what concerns us here—this volume.

"I had always," says Mr. Thiselton Dyer, "hoped to put together the results of the experience in teaching methods acquired at South Kensington in the form of a handbook, which should save teachers who wished to follow our example from much of the trouble and difficulty which I, and those who at different times have taught in this way, have had to face. But, in the meanwhile, I had been drawn off to administrative duties which left a steadily decreasing leisure for purely scientific work. Fortunately, my friend Mr. Bower was willing—and with far greater competence—to take up the task which I was unable to perform, and to him are entirely due the laboratory instructions for studying the different types selected. Dr. Vines has very kindly supplied the chapters on methods and on the morphology of the cell. But besides this he has at every step given the assistance of his own extensive experience in practical teaching." With this book before us we can understand the motive of success of the South Kensington course, for it is the most thorough introduction to the practical study of plant morphology which has yet appeared; the only book to be mentioned along with it is the recently published "Practicum" of Strasburger—(of which of course the inevitable translation is promised)—and that is laid down on somewhat different lines.

In the first chapter Dr. Vines gives an excellent account of methods and reagents, delightful in the clearness and conciseness of its language and bearing throughout evidence of the hand of one who is no mere compiler of instruction but who has himself tested and had experience of all that is explained. The manner of setting to work, of making preparation, of making cultures, of preparing reagents, is all set forth in such a way that any intelligent tyro may readily equip himself and do good work. And we must congratulate Dr. Vines on the wise selection of methods and reagents he has made for notice, and on their arrangement. The multiplicity of new methods—many with but questionable advantage to recommend them—and their technicalities even in connection with botanical work is, at the present time, somewhat appalling and it is satisfactory to have these sifted by so competent an authority.

Dr. Vines's second chapter, on the Structure and Properties of the Cell, is a very prominent and commendable feature in the book, and will prove an extremely valuable one to all practical students—the micro-chemical portion of it especially, which gives in summarised and terse form the fundamental reactions exhibited by the various elements in the plant body, which are the basis of all further laboratory work. The student finds here at once a guide for testing the dictums of the earlier chapter as well as a graphic code for reference in his future studies. A synoptical arrangement such as this, and so happily worked out, has not been attempted in any previous book.

Mr. Bower's more especial work, the morphology of the various types dealt with, is no less excellent. The examples selected for illustration appear to us particularly well chosen, being readily obtainable in any locality, and their characteristics, macroscopic and microscopic, are explained with precision and in great detail. We shall not dwell at any length upon illustration of the admirable character of this part of the book, but in evidence of its completeness will refer to the section on the vegetative organs of Dicotyledons. *Sunflower* is selected as the chief type for examination, and we have first of all a brief description of the embryo and germination; then its stem in the mature and young condition are gone over, macroscopically and microscopically; but as it shows only the herbaceous type, the arboreous type as seen in *Elm* is explained, and further, the aquatic type, as in *Mare's-tail.* Sections are next added on the stem of *Cucumber* and *Lime-tree* with a view to special illustration of the sieve-tube elements, and upon *Dandelion* and *Spurge* for laticiferous elements. In like manner the leaf is treated of, to that of *Sunflower*, which is the chief type, descriptions of *Cherry-laurel* and *Stone-crop* being appended. Again, in the case of the root, *Scarlet-runner* as well as *Sunflower* is described. Besides these

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forms we have mentioned, which are dealt with in detail, frequent references are made to other examples in which equally good or further illustration of special features may be obtained. Similar thoroughness runs through the accounts of all the types.

Every one perusing the volume must be impressed with the high standard of its educational value. Teacher and student in this country are alike to be congratulated upon its publication. The former has now a thoroughly trustworthy laboratory guide to place in the hands of pupils, and the latter has a handbook in his own language to which he can refer with confidence in his search after a sound knowledge of plant-morphology.

This is only the first part of the work, and deals with Phanerogams and Pteridophytes. May the succeeding portion not be long in appearing! It is regrettable that the original intention of the authors "to preface the directions for the study of each type with a short account . . . of its salient morphological facts" has not been carried out in this part; Mr. Thiselton Dyer assigns in the preface the reason for its postponement. We are convinced that the want of such brief epitomes will be universally felt. But as the book is certain of a full measure of success, we look forward, with the authors, to the realisation of their hope that "the original scheme upon which the work was planned" may be "carried out in a future edition."

We conclude as we began by heartily welcoming the volume. We envy a student commencing to work with such a guide, and we are greatly mistaken if its effect is not very rapidly felt in the botanical teaching of the country.

THE PENNATULIDA OF THE NORWEGIAN NORTH ATLANTIC EXPEDITION

Den Norske Nordhavs Expedition, 1876–1878. *Zoologie Pennatulida.* Ved D. C. Danielssen og Johan Koren. (Christiania: Grondahl and Sons, 1884.)

THIS is the twelfth part of the series of monographs contained in this fine work, the first part of which was published in 1880. The former parts have dealt with, besides the chemistry and physics of the expedition, the fishes, a part of the Mollusca, the Gephyrea, Annelida, Asteroidea, and Holothuroidea, the monographs on the last four animal groups being by the same indefatigable naturalists who have produced the present memoir on the Pennatulida. The work is a highly creditable one to all concerned.

The present part is illustrated by twelve excellent plates, two of which are coloured, and which are in the same style as those already published by the same authors in their well-known memoir on new Alcyonians belonging to the Norwegian fauna published two years ago.[1] Thirteen species of Pennatulida belonging to eight genera were obtained during the expedition, and of these eleven species and two genera were new. One of the new genera is Svava, a small sea-pen with rudimentary fins and devoid of spicules on the sarcosome, cells and polyps. There is a stripe of zooids on either side of the stem, and in the two lateral canals of the stem are developed the zonads on the mesenteries of these zooids. The zooids alone produce gonads, the fully-developed polyps being barren. They are viviparous, the larvæ escaping from their mouths, as in Corallium. The other new genus, Gunneria, is founded on a fragment of a single specimen, but it is characterised by the presence of an immense quantity of spicules on the bodies of the polyps, their tentacles, and the sarcosoma, which latter forms a regular calcareous crust on the walls of the cells; the spicules are so closely packed in several layers that it is difficult to separate them, even with caustic potash. In this respect Gunneria approaches the Gorgonidæ; yet it is, nevertheless, a true Pennatulid.

The main feature of the memoir is, however, the part which relates to the now famous deep-sea Pennatulid, *Umbellula encrinus*, to which more than half the letterpress and seven of the five plates are devoted.

The Norwegian Expedition obtained twelve specimens of *Umbellula encrinus* from different localities. Kolliker described eight species of the genus from the *Challenger* collection, but one of these, *U. magniflora*, is considered by the authors as referable to the old historical *U. encrinus*, as are also Lindahl's new species from the Swedish Expedition of 1871, viz. *U. miniacea* and *U. pallida*. The whole of the twelve specimens obtained by the Norwegian Expedition are here carefully described in all details. All of them differ from one another, displaying peculiarities in various ages and stages of development which might, were the series less complete, easily lead to the establishment of separate species. The largest specimen obtained was dredged from a depth of 763 metres. It is a giant indeed. The rachis and the polyps, of which there are forty in the bunch, are twice figured on the last two plates, of actual size, coloured and uncoloured. The bunch of polyps occupies with its breadth nearly the entire length of the folio plate. The plates are far the finest representation of Umbellula yet published. There are eight prominent lanceolate areas occupied by zooids which extend up between the lateral polyps on the calicle-like part of the rachis, and spread themselves inferiorly over the rachis generally. The zooids are described as having each a single protusible tentacle, the tentacle when not retracted looking like a pendent papilla. These tentacles sometimes, but not always, bear short lateral pinnules, which are hollow, their cavities communicating with those of the tentacles, and which can be retracted with them. Kölliker, in his account of the *Challenger* Pennatulids, described similar zooids each bearing a single tentacle as existing in *Umbellula Huxleyi* and *U. Carpenteri*, and in the latter species found the single tentacles branched. He figures them, but only on a very small scale. On looking at the figures here given of these zooids (Tab. X., Figs. 56, 57) it is very difficult to understand their structure: the position of the mouth is not shown in any one, and they are drawn as elongate and flask-like in form when expanded, squat and rounded when retracted. The tentacle seems when protruded to be a direct narrow prolongation of the entire body of the zooid, and it appears as if on retraction this prolongation were telescoped into the basal region of the body. The base of the single tentacle should abut on one side of the mouth, but no such mouth-opening is figured. In the enlarged view of a zooid (Fig. 57) the mouth is neither definitely indicated nor referred to in the description. The text is not at all clear on the point.

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[1] "Bergens Museum. Nye Alcyonider, Gorgonider og Pannatulider tilhorende Norges Fauna." (Bergen, 1883.)

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